

ELECTRONIC MEASURING EQUIPMENT

Short Catalog



BRÜEL & KJÆR

ES-14

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All electronic instruments may be switched to a line voltage of 100, 115, 127, 150, 220 or 240 volts at 50 to 400 c/s unless otherwise specified.
Supplied with every instrument is one plug for every socket on the instrument, as well as fuses, scale lamps, power cord etc.
Note: Due to our continuing programme of product improvement all specifications are subject to change without notice.

February 1965



A world wide network of distributors has been built-up to ensure quick and reliable service in any area. In addition, a staff of experienced electronic engineers, trained at the B & K factory, are regularly visiting representatives and customers all over the world.



Brüel & Kjær will be met at any electronic fair or exhibition of importance within their field, showing the latest achievements in their development work. Throughout the growth of the company the aim has always been to manufacture instruments of the highest quality and precision, and dependability based upon advanced scientific research is the foundation upon which our continued progress is built.

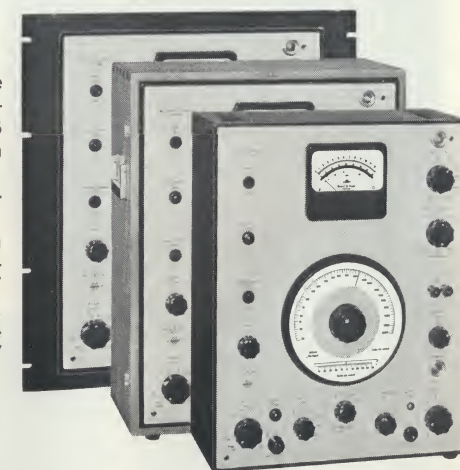
Cabinet System

Instruments with a 40 cm wide front plate are available with three different types of cabinets. To indicate which type of cabinet is desired, a letter, A, B or C should be added to the type number when ordering the instruments.

"A". Indicates that the instrument is delivered in a light-weight metal cabinet.

"B". Indicates that the A-version is covered with a mahogany cabinet with **handles** and **lid** for transportation. The mahogany cabinet is fitted to the "A" version as an extra protection for the instrument.

"C". Indicates that the A-version is inserted in a frame which allows it to be mounted directly into a 19" standard rack.



The Brüel & Kjær **Technical Review** is issued four times a year. The Technical Reviews, which deal with different measuring problems, are available on request, and are mailed free of charge.

If more detailed information other than that given in this short form catalog is required, then write or phone for technical data or for the Brüel & Kjær **Instruction Manuals**, in which you will find a detailed description of the instruments.

For more than 20 years Brüel & Kjær A/S have been manufacturing precision measuring instruments for the electrical, electro-acoustical and mechanical field.





1022 B 1:8



4709 A 1:8

Type 1013 Beat Frequency Oscillator is a signal generator that covers the frequency range from 200 c/s to 200 kc/s. The instrument includes a regulator stage for external feedback, an accurate built-in V. T. voltmeter; an internal generator for variable frequency modulation of the output signal and a 90 dB output attenuator variable in 10 dB steps. The output impedance is variable to give maximum power output (2.5 W) in a load of 6–60–600 or 6000 ohms. It features a true logarithmic frequency scale, a frequency interpolating scale, and a clutch for connection to an external motor drive for automatic tuning. Distortion is less than 0.3 % at 10 kc/s unloaded.

See also combined units Type 3306 and 3328.

Type 1017 Beat Frequency Oscillator is similar to BFO 1013. Frequency range: 2 to 2000 c/s. No frequency modulation system. Variable meter damping. Distortion less than 0.25 % at 100 c/s unloaded.

See also combined units Type 3307 and 3328.

Type 1022 Beat Frequency Oscillator is similar to BFO Type 1013 with the exception of the following. Frequency range 20 c/s to 20 kc/s. Output attenuator: 100 dB. The distortion is less than 0.1 % at 1000 c/s unloaded.

See also combined units Type 3308, 3329 and 3332.

Type 1013 — 1017 — 1022 are available as A-, B- or C-models.

Type 4709 Audio Frequency Response Tracer for production testing and inspection of amplifiers, grammophones, tape recorders, filters, loudspeakers and other electro-acoustic devices in the frequency range from 20 c/s to 20 kc/s. The instrument contains a cathode-ray oscilloscope with a 14" long persistence screen; logarithmic y-amplifier with three dynamic ranges: 50 dB logarit., 25 dB logarit. or linear.

The horizontal deflection is determined by the frequency of the input signal i.e. it is proportional to the logarithm of the input signal frequency. Standard frequency ranges: 20–20000 c/s and 200–5000 c/s total horizontal scale. Used in conjunction with B.F.O. Type 1022 frequency sweeps are provided automatically with built-in motor drive (motor drive unit delivered with Type 4709).

Sweep speeds: variable from 3 oct./sec. to approx. 1/3 oct./sec. Any portion of the frequency range may be scanned automatically. Available as A- or C-model.

Type 1402 Random Noise Generator gives a random noise signal with uniform spectrum density ("white" noise) in the frequency range 20–20000 c/s, within ± 0.5 dB. Symmetrical Gaussian magnitude distribution to more than 4 σ . The Noise Generator has a built-in 3 dB/Octave weighting network. Selectable output impedances, intended for loads of 6, 60, 600, and 6000 ohms. Power output 0.25 watts (instantaneously 4 watts at the noise peak magnitudes). Various output voltages, maximum 40 V R.M.S., 170 V peak. The built-in indicating meter, with selectable integrating times, measures the true R.M.S. of the noise voltage. An output is provided, having a calibrated step attenuator. The primary noise source is a special B & K design, equipped with two semiconductor noise diodes. The signal/hum ratio is as high as 70 dB, which ensures Gaussian magnitude distribution, even for narrow bands of noise at the power line frequencies. Additionally, the Noise Generator is provided with terminals for connection of external filters. When using the B & K Band-Pass Filters Type 1612 1/3 or 1/1 octave noise bands can be selected successively from the Noise Generator in the range 11–35000 c/s.

See also voltmeter Type 2417.

Available as A-, B- or C-model.

Type 1024 Sine Random Generator gives 3 types of signals: sine waves, narrow bands of random noise and wide band random noise. It has output facilities similar to those of Type 1022 for sine waves. For narrow band noise the maximum output power is 0.25 W. The output for wide band noise corresponds to that of the Noise Generator Type 1402. Random noise bandwidth of 10–30–100 and 300 c/s. Logarithmic frequency scale similar to type 1022 with provision for external sweep drive.

Available as A-, B- or C-model.

See also combined units Type 3309, 3334, and 3335.

Type 3204 Tapping Machine is designed for field and laboratory measurements of impact sound transmission in buildings and other structures. This impact sound generator, which complies with ISO recommendations, produces 10 standard impacts per second. Operates from 50 c/s or 60 c/s supplies. Five hammers are used, each weighs 500 g and falls vertically through 4 cm. Both steel and rubber hammer-heads supplied. Housed in mahogany cabinet, 55 cm X 20 cm X 20 cm. Weight 16 kg (35 lbs.). Used in conjunction with Type 3315 for spectrum analysis.



1402 B 1:8



1024 B 1:8



3204 1:10



2107 B 1:8



2112 B 1:8

Type 2107 Frequency Analyzer is a frequency selective vacuum-tube voltmeter, continuously variable through six ranges covering the frequencies from 20 c/s—20 kc/s. Input impedance is 2.2 M Ω . Linear response 2—45000 c/s. Constant percentage bandwidth type, bandwidth variable in steps from 6 % to 29 %. The internationally standardized weighting networks are built-in and can be inserted at the same time as the band-pass filters. The instrument can be connected via a flexible drive to the Level Recorder Type 2305, and the frequency ranges scanned in synchronism with the preprinted recording paper scales. Frequency analysis can then be carried out automatically. The meter rectifier can be switched to indicate true RMS, average or peak values. Two different degrees of meter damping are included. Linear meter scale calibrated in volts, also dB-scale and percentage scale for absorption measurements in conjunction with Type 4002. Input and power supply socket as described under Type 2603. See also combined units Type 3314 and 3333. Available as A-, B- or C-model.

Type 2112 Audio Frequency Spectrometer is a high-gain, low-noise amplifier with 11 octave filters and 33 $\frac{1}{3}$ -octave band-pass filters for accurate analysis of the frequency spectrum in the range 22 c/s to 45 kc/s. Center frequencies from 31.5 c/s to 31.5 kc/s and 25 c/s to 40 kc/s. Three standardized weighting networks for sound level measurements are included. Used as VTVM the frequency characteristic is linear from 2 to 45000 c/s. Input impedance 2.2 M Ω /30 pF. With a switch for average, peak or true RMS indication the output may be read directly on the built-in VTVM, or the instrument may be conveniently connected to the Level Recorder 2305. Two different degrees of meter damping included. The scale is calibrated in volts, decibels and in % absorption for use in connection with 4002. Input connector and power supply is provided for Cathode Followers, Artificial Ears, Microphones etc. as listed under Type 2603. A.C. operated. See also combined units Type 3315, 3332 and 3335. Available as A-, B- or C-model.

Type 1607 Frequency and Distortion Measuring Bridge is a tunable blocking network for more than 80 dB attenuation of any single frequency within the range 20 to 20000 c/s. 20 dB \pm 1 dB attenuation of frequencies between 2nd and 7th harmonic of the blocked frequency. Input resistance 5.5 k Ω —19 k Ω . The bridge is normally used in conjunction with the VTVM 2409, Amplifier 2603, 2604, Analyzer 2107 or Spectrometer 2112 for measurements of extremely low harmonic distortion.

Available as A-, B- or C-model.

Type 1612 Band-Pass Filter Set for complex signal analysis consists of 11 octave and 33 fixed $\frac{1}{3}$ -octave band-pass filters, with center frequencies from 31.5 c/s to 31.5 kc/s and 25 c/s to 40 kc/s respectively. The internationally standardized weighting networks for sound level measurements are also included. The filters can be manually selected by means of the 50-position switch or automatically scanned when coupled to the Level Recorder 2305. The Amplifier 2603 or 2604 or Frequency Analyzer 2107 is ideally suited for use with the Filter Set for making audio frequency spectrum analysis.

Available as A-, B- or C-model.

See also combined unit Type 3333.

Type 1620 Extension Filter Set contains three $\frac{1}{3}$ Octave band-pass filters with the center frequencies 12.5, 16 and 20 c/s and one $\frac{1}{1}$ octave filter, center frequency 16 c/s. Extends downwards the measuring range of Spectrometer 2112 and Band-Pass Filter Set 1612. Available as A-, B- or C-model.

ZS 0146 Filter Chassis is electrically identical to Type 1620 mentioned above, but is delivered without cabinet. For mounting in the combined units Type 3315, 3332, 3333 and 3335.

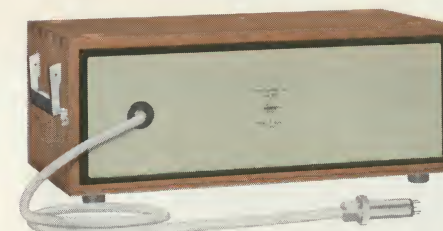
ZS 0301 Psophometer Filter is designed for noise measurement in radio broadcasting audio systems. It should be used with Microphone Amplifier 2603—2604 or Analyzer 2107—2112. Meets the requirements of C.C.I.F. recommendations.



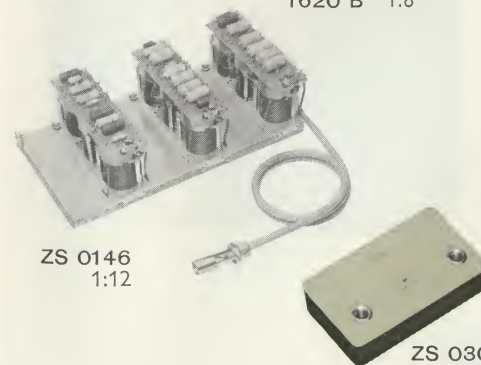
1607 B 1:8



1612 B 1:8



1620 B 1:8



ZS 0146
1:12

ZS 0301
1:10





2006 B 1:8



2603 B 1:8

Type 2006 Heterodyne Voltmeter is a frequency selective VTVM for the measurement of amplitude, frequency, and modulation of radio frequency signals, within the range from 40 kc/s to 230 Mc/s in 7 ranges. Dynamic range 1 μ V to 50 V. 75 Ω or high impedance input. Frequency modulation meter 0–80 % AM or 0–80 kc/s FM. Bandwidth 3 kc/s and 250 kc/s. The instrument is a.c. operated or operated by rechargeable batteries. Built-in calibration generator 30 Mc/s, 2.5 mV. Available as A-, and B-model.

Type 2603 Microphone Amplifier is a low noise amplifier with indicating meter. Amplification adjustable in 10 dB steps from –40 to +100 dB. Input impedance 2 M Ω . Flat response curve from 2 to 45000 c/s. A switch changes this linear characteristic into one of the three standardized weighting curves for sound level measurements. Two different degrees of meter damping included. Meter rectifier can be switched to indicate true RMS, average, or peak values. Supplied with a screened coaxial input socket and a 7-pole socket for connecting the Cathode Followers Type 2612–13–14 and 15, the Hearing Aid Test Box Type 4212, the Microphone Selector Type 4408 or the Preamplifier Type 1606. Provision is made for insertion of external filters such as the Band-Pass Filter Set 1612. A.C. operated. Available as A-, B- or C-model. See also combined units Type 3329 and 3334.

Type 2604 Microphone Amplifier is similar to Type 2603 except for the frequency response, which is flat from 10 c/s to 200 kc/s. Input impedance 1.1 M Ω . Available as A-, B- or C-model.

Type 2409 Electronic Voltmeter is a vacuum-tube voltmeter for A.C. measurements in the frequency range 2 c/s to 200000 c/s. 11 voltage ranges at full-scale deflection 10 mV to 1000 volts. Built-in reference voltage. Input Impedance 10 Megohm. Meter rectifier can be switched to indicate **true RMS**, average, or peak values. Two different degrees of meter damping. The instrument is supplied with output terminals and is also well-suited for use as calibrated amplifier.

Type 2416 Electronic Voltmeter is similar to Type 2409 but mounted in a steel cabinet with flange for 19" rack mounting (height 7").

Type 2410 RMS Audio Voltmeter for the frequency range from 5 c/s to 50 kc/s. Sensitivity for full-scale deflection variable in 10 dB steps from 0.01 to 1000 volts. Input impedance 1.5 Mohms. Quasi RMS indication of all AC signals with crest factor up to 3. Maximum gain 60 dB. A.C. operated.

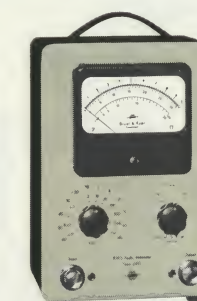
Type 2417 Random Noise Voltmeter is meant for measurement of narrow band random noise. Variable time constant from 0.3 sec. to 100 sec. allows measurements on noise bands as narrow as 3 c/s band-width. Frequency Range 2 c/s – 20 kc/s. Quasi RMS indication of complex signals. DC output for Level Recorder. Input impedance and sensitivities as for Type 2410.



2409/17 1:8



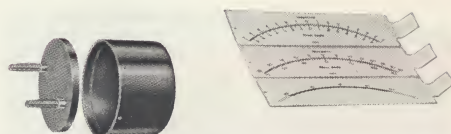
2416 1:8



2410 1:8



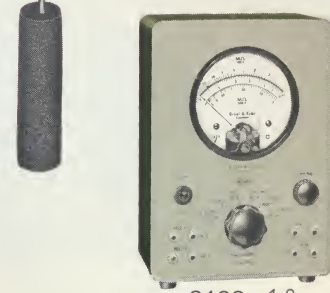
1503-1504 1:8
1505-1506



ZR 1702 1:4



3902 1:8



2423 1:8

Type 1503 Deviation Bridge is a fast direct-reading instrument for accurately determining the percentage deviation of impedance and phase angle of resistors, inductors and capacitors from an external standard. Test component ranges, Resistance: $1\ \Omega$ to $30\ M\Omega$. Inductance: $2\ mH$ to $2000\ H$, and Capacitance: $500\ pF$ to $5000\ \mu F$. Six interchangeable meter scales included, four calibrated -1.5% to $+1.5\%$, -7% to $+8\%$, -25% to $+35\%$, -50% to $+100\%$ plus two blank scales. Test frequency $100\ c/s$. A.C. operated.

Type 1504 Deviation Bridge is similar to Type 1503 except for the measuring ranges: $R = 10\ \Omega$ to $10\ M\Omega$, $L = 2\ mH$ to $100\ H$, and $C = 50\ pF$ to $10\ \mu F$. Test frequency $1000\ c/s$. A.C. operated.

Type 1505 Deviation Bridge is similar to Type 1503 but covers the measuring ranges: $R = 10\ \Omega$ to $1\ M\Omega$, $L = 0.2\ mH$ to $2\ H$, and $C = 30\ pF$ to $1\ \mu F$. Test frequency $10\ kc/s$. A.C. operated.

Type 1506 Deviation Bridge is similar to Type 1503 but for the measuring ranges: $R = 10\ \Omega$ to $50\ k\Omega$, $L = 20\ \mu H$ to $20\ mH$, and $C = 20\ pF$ to $0.1\ \mu F$. Test frequency $100\ kc/s$. A.C. operated.

ZR 1702 Box for Standard resistors, inductors, or capacitors for Deviation Bridges 1503, 1504, 1505, and 1506, with two pins for direct connection to the terminals of the bridges. Min. quantity 10 units.

Type 3902 Test Jig facilitates rapid production testing of components in conjunction with Deviation Bridges 1503, 1504, 1505, and 1506. Knee-operated lever provided for the opening of the spring-loaded binding posts. The Bridge can be placed directly on the Jig and the Jig conveniently mounted on a table or a bench.

Type 2423 Megohmmeter is a sensitive, highly accurate instrument for resistance measurements in 7 ranges from $0.1\ M\Omega$ to $10^7\ M\Omega$ using test voltages of $10\ V$ and $100\ V$. In addition the instrument can be used as a D.C. voltmeter covering $10\ mV$ to $2000\ V$ in five ranges with full deflection for $1\ Volt$, 10 – 100 – 1000 and $10000\ Volts$, and for measurement of D.C. currents from $10\ pico\text{-}amp.$ to $100\ \mu\text{amp.}$ in 6 ranges. Input impedance $1000\ M\Omega$ and $100\ M\Omega$. Semi-logarithmic meter scale. A.C. operated.



Type 6102 Roughness Meter for the measurement and control of surface roughness of machined surfaces. Sensitivity for full-scale deflection 0.1 to $30\ \mu\text{meters}$, and 3 to $1000\ \mu\text{inches CLA}$. Four-position switch controls roughness-width cut-off: 0.075 – 0.25 – $0.75\ mm$ (0.003 – 0.01 – $0.03\ inch$) plus "High" cut-off position for monitoring roughness profiles. Stylus type pick-up **MP 6100** is included, diamond tip radius: $12\ \mu\text{m}$ ($500\ \mu''$), stylus pressure: $1\ gramme$ (max.). The meter is equipped with adjustable tolerance pointers. Output terminals with output switch selecting: (1) AC output for monitoring with oscilloscope or spectrometer, (2) CLA output for recording of the indications of the meter during production control. Accessories included: Reference Specimens **MA 0014** for absolute calibration of the Roughness Meter and check on the tip radius of the diamond stylus. Pick-up Handle and Wire Guides.

MP 0001 Fine Surface Pick-up. Similar to MP 6100 but diamond stylus tip radius is: $2.5\ \mu$ ($100\ \mu''$), stylus pressure $0.5\ gramme$.
MP 0002 Small Bore Pick-up for use in bore holes with diameter down to $3\ mm$ ($0.12\ inch$). Operational data as MP 6100.

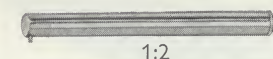
Type 3910 Motor Drive guides the pick-ups of Type 6102. Traversing speeds 1 and $3\ mm/sec$. The traversing length is adjustable between 1 – $40\ mm$. The height of the stylus in comparison to the plane on which the motor drive is positioned is adjustable from -25 to $130\ mm$.

MA 0014 Reference Specimen for calibration and control of roughness measuring instruments with stylus type pick-up.

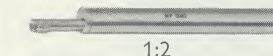
Type 3930 Complex Modulus Apparatus is designed for dynamic measurement of the complex modulus of elasticity (Young's modulus + internal damping factor) of solid materials and coating deadeners. Type 3930 is a precision test jig for clamping sample bars and mounting the two magnetic transducers **MM 0002** which are included. Type 3930 operates at temperatures of up to $+250^\circ C$ ($480^\circ F$). It is designed to be used in conjunction with the combined units Type 3329 or 3332 providing all facilities for accurate measurements in the range $20\ c/s$ – $20\ kc/s$. Height: $33\ cm$ ($13''$). Weight: $6.7\ kg$ ($14.8\ lbs.$).

MM 0002 Magnetic Transducer is an electro-mechanical transducer of the variable reluctance type which can be used as velocity-sensitive vibration pick-up or as electro-magnetic vibration exciter. Temperature range up to $+250^\circ C$ ($480^\circ F$). Small high- μ discs to be cemented in front of the transducer are supplied for detection or excitation of non-magnetic structures.

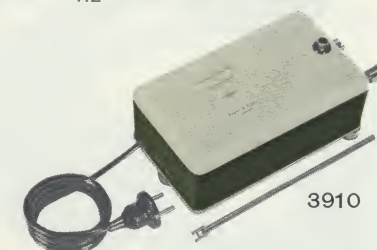
6102 1:8



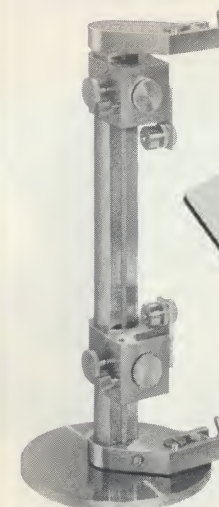
MP 6100/MP 0001



MP 0002



3910 1:8



3930 1:8



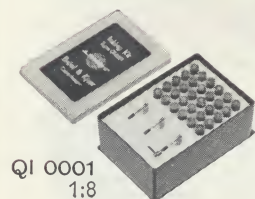
MA 0014 1:5



MM 0002 1:6



2305 A 1:8

QR 0001
1:8ZR 0001/06
1:8

2305 B 1:8

Type 2305A Level Recorder is designed for the accurate recording of signal levels in the frequency range from 2 c/s to 200 kc/s as well as for DC signals. Levels may be recorded as a function of time or of frequency when the recorder is used in conjunction with one of the B & K Beat Frequency Oscillators or Frequency Analyzers. Recordings can be made by means of ink or by means of sapphire stylus writing on wax-coated paper. Lined or frequency calibrated paper is available. Two chart widths: 100 mm (4") or 50 mm (2"). Switch selection of full-wave peak, average or **true RMS** detection of the input signal. 15

different writing speeds between 4 mm and 2000 mm per sec with 100 mm writing width, and 2 mm to 1000 mm per sec with 50 mm writing width can be chosen. Twelve chart speeds from 0.0003 mm/sec to 100 mm/sec. 6 high resolution input potentiometers available providing dynamic ranges from 10 dB to 75 dB. Built-in reference voltage of 100 mV. Built-in polar plotter. Two shafts with individually variable speed for connection to other B & K instruments, are included (for synchronous operation with oscillators, analyzers etc.). Remote control of pen lifting, eventmarker and paper drive motor. Built-in control switch for Spectrometer Type 2112. Built-in input switch for simultaneous recording of two signals. A.C. operated. Specify 50 or 60 c/s when ordering. Steel cabinet.

Accessories included: 1 Range Potentiometer (ZR 0005, 50 dB unless otherwise specified). 2 rolls of paper, 2 sapphire styles, 1 reverberation curve protractor and 1 **inking kit** **QI 0001** containing: 3 inking pens, 1 eventmarker pen, 10 cartridges of black, 10 cartridges of red and 10 cartridges of green ink.

Available as A-, B- or C-model.
See also combined units Type 3306 and 3335.

Potentiometers for 2305

linear 10 — 35 mV	ZR 0001
linear 10 — 110 mV	ZR 0002
logarithmic 10dB	ZR 0003
logarithmic 25 dB	ZR 0004
logarithmic 50 dB	ZR 0005
logarithmic 75 dB	ZR 0006

QI 0100 100 cartridges of black ink for 2305.
QI 0200 100 cartridges of red ink for 2305.
QI 0300 100 cartridges of green ink for 2305

Type 3921 Turntable is designed to rotate a test object (such as antenna, loudspeaker etc.) in synchronism with the rotation of the polar diagram paper on the Level Recorder Type 2305. Max. table load at center; 100 kg. AC operated, specify 50 or 60 c/s when ordering.

SC 2361 Protractor for determination of reverberation time from decay curves recorded on Level Recorder 2304 or 2305.

ZR 0021 Analog Voltage Read-out for Level Recorder Type 2305 contains a potentiometer mechanically linked to the writing arm of the Level Recorder providing a voltage output suitable for digital voltmeters.

QR 2007 Monophonic Gliding Frequency Recordings for use in conjunction with Type 4409 and Level Recorder 2305 for testing of grammophone pick-ups. Contains 5 records with 20 tracks each. In accordance with IEC recommendations. Frequency Range 20 c/s — 20 kc/s.

QR 2008 Pick-up Test Recordings. Five 12" — 33 1/3 r.p.m. records with identical faces bearing a series of calibrated stereophonic recordings containing spot frequencies, reference tones, tracking and tone arm resonance bands providing all facilities for pick-up design and adjusting work.

QR 2009 Stereophonic Gliding Frequency Recordings as QR 2007 but with 2 X 4 tracks on each side for stereophonic tests.

Type 4409 Response Test Unit for Tape- and Record Players is designed for automatic recording of frequency response curves and testing for cross talk of sound reproducing equipment. Used in conjunction with Level Recorder 2305, Beat Frequency Oscillator 1022 and Amplifier 2603. Contains synchrostarter, equalizing filters, and two channel selector for simultaneous recording of stereophonic signals.

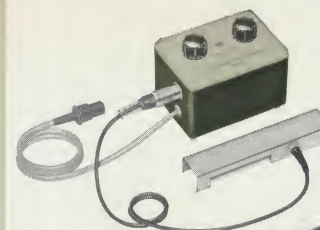
UB 0041 Flexible Shaft for the mechanical connection between Type 2305 and other B & K instruments.

Type 4420 Statistical Distribution Analyzer is primarily for resolving the writing width of the Level Recorder 2305 into 12 class intervals, and presenting a digital display of the distribution of recorded levels.

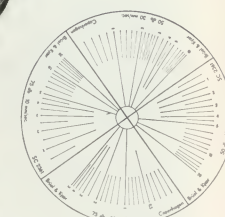
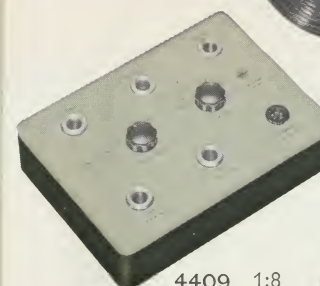
UB 0009 Mechanical Extension Connector for the connection of two flexible shafts UB 0041.



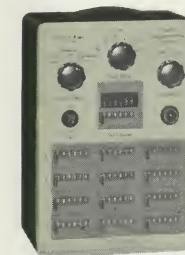
3921 1:10



ZR 0021 1:8

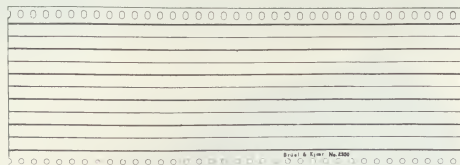
SC 2361
1:4QR 2007/08/09
1:10

4409 1:8

UB 0041
1:10

4420 1:8

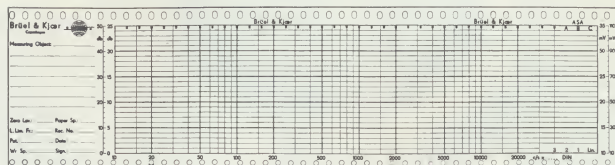
UB 0009
1:4



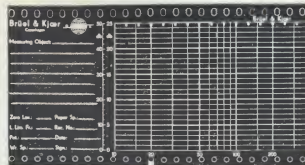
QP 2350/51



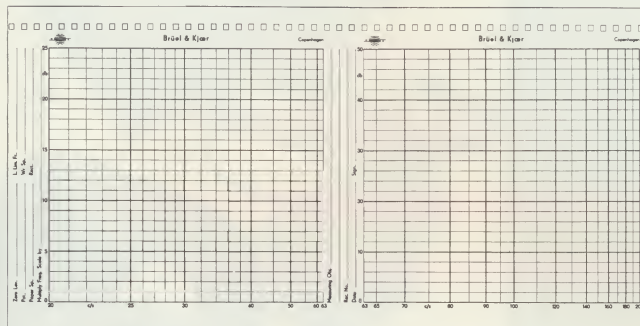
QP 3606



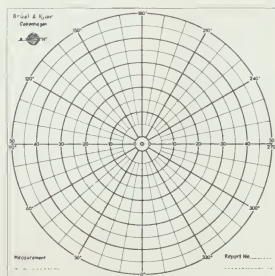
QP 3614/15/16



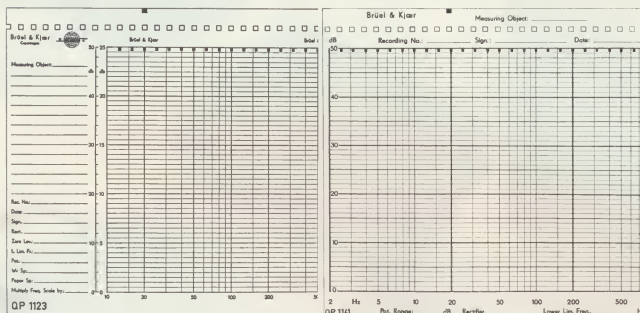
QF 0003



QP 1130

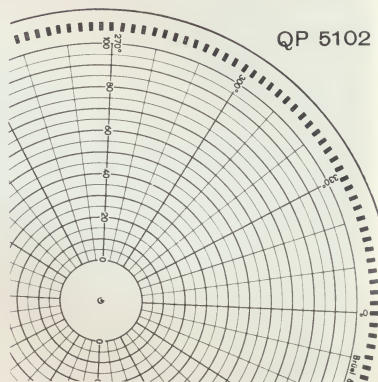


QP 2372

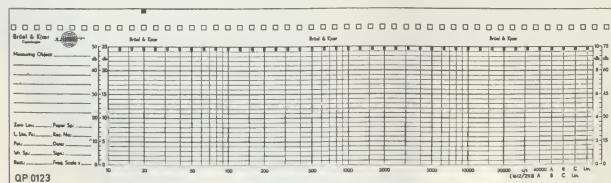


QP 1123

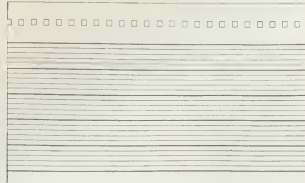
QP 1141



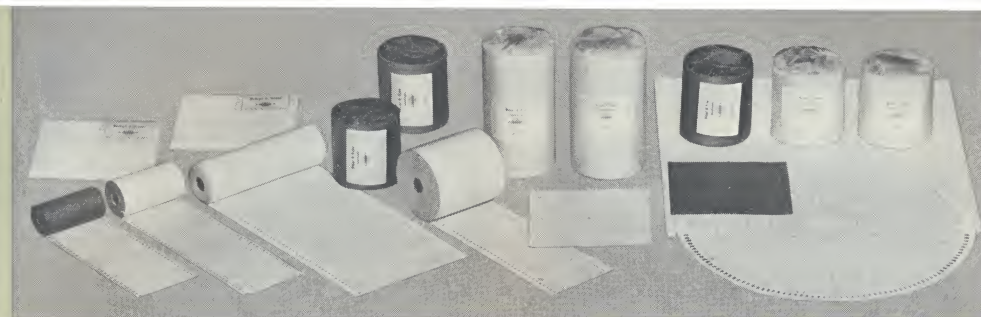
QP 5102



QP 0123/0423



QP 0102/0402



RECORDING PAPER FOR TYPE 2304

Rolls of 60 metres

Packages of 100 sheets

	Lined for 10–25 and 50 dB potentiometer	Frequency calibrated 10 c/s–32 kc/s	Without printing	Lined for 75 dB Potentiometer (Time calibrated for Type 2333)	Polar diagram charts for Type 2370
	Type	Type	Type	Type	Type
White paper for ink writing	QP 2350	QP 3614	—	—	—
White waxed black paper for stylus writing. Width 50 mm	QP 2351	QP 3615	—	QP 3606	QP 2372
Red waxed transparent paper for stylus writing. Width 50 mm		QP 3616	QP 3610	—	—

QF 0003. Photographic negative and dia-positive for blueprinting of the calibration graph. Corresponds to QP 3616.

QF 0008. Photographic negative and dia-positive for blueprinting of the calibration graph corresponding to the frequency calibration of Type 2107.

RECORDING PAPER FOR TYPE 2305

Rolls of 60 metres

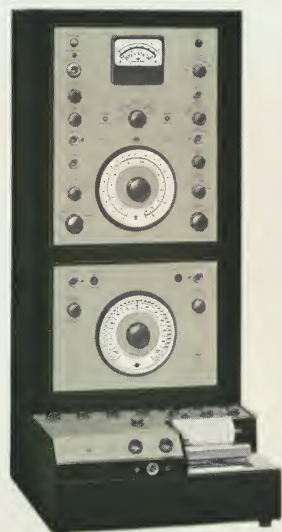
All suitable for direct blueprinting of both recording and calibration network	Lined	Frequency calibrated 10 c/s–40 kc/s	Frequency calibrated for Type 2107 20 c/s–20 kc/s	Frequency calibrated for Type 3327/28 2 c/s–200 kc/s
	Type	Type	Type	Type
White paper for ink writing width 100 mm	QP 1102	QP 1123	QP 1130	QP 1141
White paper for ink writing width 50 mm	QP 0102	QP 0123	—	—
White waxed transparent paper for stylus writing width 50 mm	QP 0402	QP 0423	—	—

QP 5102 Polar diagram charts, radius 100 mm, for ink writing used with 2305–3921. Packages of 100 sheets.

Unit prices of paper are based on a minimum purchase of 10 rolls/packages of each type. Prices are less 10 % when more than 100 rolls/packs. are ordered and plus 10 % when less than 10 rolls/packs. are ordered.



3308 1:10



3333 1:16

Combined Units.

The combined units described on this and the following page are all built on the Level Recorder Type 2305 as the fundamental instrument. The instruments as a complete unit are coupled to the Level Recorder motor, so as to obtain automatic scanning of the frequency range, synchronously with the drive of the Level Recorder paper. For additional information see the particular instrument description. Frequency calibrated paper is supplied. The units are mounted in steel cabinets.

Type 3306 Automatic Frequency Response Recorder consists of BFO Type 1013 and Level Recorder Type 2305. It is designed for recording frequency response curves, measurement of reverberation time etc.

Type 3307 Automatic Frequency Response Recorder consists of BFO Type 1017 and Level Recorder Type 2305. It is designed for recording frequency response curves, measurement of reverberation time etc.

Type 3308 Automatic Frequency Response Recorder consists of BFO Type 1022 and Level Recorder Type 2305. It is designed for automatic recording of frequency response curves, measurement of reverberation time etc.

Type 3309 Automatic Frequency Response Recorder consists of Sine Random Generator Type 1024 and Level Recorder Type 2305. Designed for automatic recording of frequency response curves, reverberation decay curves etc.

Type 3314 Narrow Band Spectrum Recorder consists of a Frequency Analyzer Type 2107 and a Level Recorder Type 2305. This continuously variable spectrum recorder enables automatic recording of narrow band analysis. Switching between the six ranges of the Frequency Analyzer is automatically provided.

Type 3315 Audio Frequency Spectrum Recorder consists of an Audio Frequency Spectrometer Type 2112 and a Level Recorder Type 2305. It is mainly designed for the automatic recording of spectrograms such as used in noise or vibration analysis.

Type 3328 Automatic Frequency Response Recorder consists of BFO's Type 1013 and 1017, and Level Recorder Type 2305. Designed for automatic recording of frequency response curves from 2 c/s to 200 kc/s in one sweep. Automatic output regulation (compressor) provided.

Type 3329 Automatic Frequency Response Recorder consists of BFO Type 1022 Microphone Amplifier Type 2603, and Level Recorder Type 2305. Designed for use in conjunction with the Complex Modulus Apparatus Type 3930 as well as for recording frequency response curves etc.

Type 3332 AF Response and Spectrum Recorder consists of a Beat Frequency Oscillator Type 1022, an Audio Frequency Spectrometer Type 2112 and a Level Recorder Type 2305. It is designed for selective recording of frequency response characteristics.

Type 3333 Spectrum Recorder consists of a Frequency Analyzer Type 2107, a Band-pass Filter Set Type 1612 and a Level Recorder Type 2305. It is designed for automatic recording of narrow band, or 1/3 octave and 1/1 octave analysis of noise and vibration.

Type 3334 Automatic Frequency Response Recorder consists of Sine Random Generator Type 1024, Level Recorder Type 2305 and Microphone Amplifier Type 2603.

Type 3335 Audio Frequency Spectrum Recorder consists of Sine Random Generator Type 1024, Spectrometer Type 2112 and Level Recorder Type 2305. It is designed for analysis and recording of reverberation decay curves etc.



3314 1:10



3332 1:16

Electroacoustic Transmission Measuring Systems



3350 1:15

Type 3350 Electroacoustic Transmission Measuring System is designed for objective measurements of reference equivalents of complete subscriber's telephone sets or single parts thereof. It will measure sending, receiving and side tone reference equivalent by indicating the o.6 or 1st power of the integrated r.m.s. value measured over the 200–4000–200 c/s range varied logarithmic in 1 sec. on a modified Type 1022 B.F.O.

Replaceable scales in dB or N on the Reference Equivalent Meter Type 4901. Frequency response is visualised on Curve Tracer 4709 or permanently recorded on Level Recorder Type 2305. Non-linear distortion and noise may be recorded through 1/3-octave Analyzer 2112. Microphone d.c. supply and feeding coils for various impedances, carbon microphone d.c. resistance measurements, sending and receiving impedance in choice of 200–600–900 Ω and weighting for the artificial voice according to S.F.E.R.T. are all built into the Power Supply Type 4902. Compressor Regulated Artificial Mouth Type 4216 con-

stantly monitored by Type 2603 and Artificial Ear are mounted in a Telephone Receiver Test Head Type 4903 holding the handset and allowing various positions of test. The Artificial Ear is based on Condenser Microphone 4132 + 2615 + UA 0081 and supplied with 4 cm³ (Dr. Braun) and 6 cm³ (ASA and NBS) couplers (DB 0597, DB 0598). Regulating system in 4216 based on 4134 + 2615. UA 0095, holder for transmitter inserts, UA 0086, holder for receiver inserts supplied for production testing. Easy calibration procedure: Pistonphone Type 4220 included.

Type 3351 Electroacoustic Transmission Measuring System is designed for production control measurements, it contains the same units as Type 3350 with the following exceptions. Type 4709 is omitted. Type 2305 replaced by KQ 0021 (cabinet for accessories). Type 2112 replaced by Type 2603 + FS 0065 and Type 4903 replaced by UA 0085, UA 0086, UA 0095, UA 0096, UA 0097 holding devices for Artificial Ear, Mouth and inserts including transparent covers for the vertical front panels.

Condenser Microphones designed for precision measurements, and featuring, in particular small dimensions wide frequency and dynamic ranges, and excellent long-term stability. Six different microphone cartridges with four different associated cathode followers cover all types of measurement at audio and ultrasonic frequencies. The microphone cartridges are screwed directly (or by means of an adaptor **Type UA 0035** in the case of the quarter-inch cartridges) onto the associated cathode follower, making a rugged unit well suited for "in the field" use. An individual calibration chart with frequency response plot is delivered with each cartridge. Type 4132 fulfils the requirements of ASA Z 24.8. 1949 (Type L).

The **Cathode Followers** are powered directly from the "Condenser Microphone Input" socket of the B & K instruments.

Cathode Follower Type	2612	2613	2614	2615
Diameter of housing	23.77 mm (0.936")		12.7 mm (0.5")	
Connection Type	Goose-neck	2 m-long cable	Goose-neck	2 m-long cable
Input impedance	270 M Ω /3 pF		700 M Ω /3 pF	
Output impedance	approximately 750 Ω			

Cartridge Type	4131	4132	4133	4134	4135	4136
Diameter	0.936" 23.77 mm		0.5" 12.7 mm		0.25" 6.35 mm	
Associated Cathode Follower	2612 or 2613		2614 or 2615		UA 0035 + 2614 or 2615	
Sensitivity at cath. foll. output	5mV/ μ bar		1mV/ μ bar		0.2 mV/ μ bar	
Polarization voltage	200 Volts					
Frequency response*)	20 c/s		20 c/s		30 c/s	
flat range limits	(1)	18 kc/s	40 kc/s		100 kc/s	
		(2)	20 c/s 7 kc/s	20 c/s 20 kc/s		30 c/s 70 kc/s
Dynamic range**)	15 dB—		32 dB—		64dB—	
	146 dB		160 dB		174dB—180dB	
Temperature coefficient	less than ± 0.01 dB/ $^{\circ}$ C. (between -50° C and $+60^{\circ}$ C)					

*) (1) Free-field normal incidence (0 $^{\circ}$).

(2) Pressure (and random incidence for 4134).

**) From A-weighted noise level to 4% distortion level re. 0.0002 μ bar.

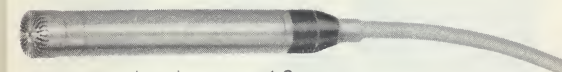
UA 0030 Input Adaptor adapts $\frac{1}{2}$ " microphones to Sound Level Meter or 1" cathode followers.

UA 0039 Extension Connector is a flexible rod used to mount $\frac{1}{2}$ " or 1" microphones remote from 1" cathode followers or sound level meter.

Condenser Microphones



4131/32 + 2613 1:2



4133/34 + 2615 1:2



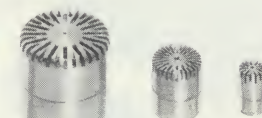
4135/36 + UA 0035 + 2615 1:2



UA 0030 1:3



4131/32 1:3



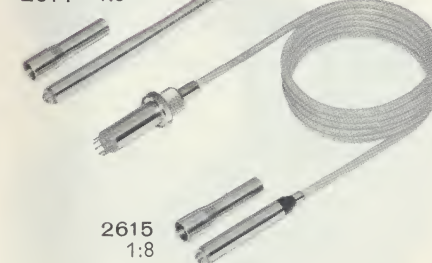
4133/34 1:2

4135/36 1:2



UA 0035 1:2

2614 1:8



2615 1:8



UA 0039 1:8



Type 4240 Noise Source is designed for field check of sound measuring equipment, fits on the 1" and 1/2" microphones or any of the type L laboratory standard microphones. Produces a noise level of approx. 108 dB RMS. Individually calibrated. Accuracy ± 1.5 dB.

Type 4220 Pistonphone is a battery driven portable instrument for calibration of B & K Sound Level Meters, sound measuring arrangements etc. Sound level: 124 dB re 2×10^{-4} μ bar individually calibrated. Accuracy: ± 0.2 dB. Frequency: 250 c/s $\pm 1\%$. Sinusoidal waveform. Distortion normally less than 3%. Barometer for direct reading of corrections due to changes in atmospheric pressure included. Batteries: 7 Mallory RM3R mercury cells are included.

Type 2630 Cathode Follower is similar to Type 2613, but battery driven, (3 \times Mallory RM1 cells included) for use with portable equipment. The low output impedance, 300 ohms, makes it suitable for use in conjunction with long cable connections. The dynamic range is approximately 15 dB less than for Type 2613.

Type 4142 Microphone Calibration Apparatus for accurate calibration of the B & K Condenser Microphones according to the standard reciprocity calibration technique. Permits measurements of the absolute sensitivity and pressure frequency response. Built-in 800 volts supply for Electrostatic Actuator. Accessories included: Two Electrostatic Actuators, three couplers (20-cm³, 3-cm³ and 0.3-cm³), 4131 (unless otherwise specified), AO 0013, insert voltage rings etc.

AO 0033 Microphone Extension Cable allows the 1" or 1/2" microphone to be mounted remote from the Sound Level Meter 2203. It has a double screen utilizing the guard-ring system. Length: 3 meters.

UA 0023 Electrostatic Actuator designed for measurements of the pressure response frequency characteristic of the Microphone Cartidges 4131 and 4132.

UA 0033 Electrostatic Actuator for measurements of the pressure response frequency characteristic of the B & K 1/2" microphones.

UA 0040 Probe Microphone Kit consists of 4 probe tubes with 0.5-1-2-4 mm outside diameters. For Type 4134 1/2" microphones. A coupler is supplied for calibration of sensitivity and frequency response. Tools for cutting and materials for damping the probes are supplied.



UA 0056 Rain Cover for 1/2" microphones. For continuous out-door use. Built-in electrostatic actuator for sensitivity checks.

UA 0055 Random Incidence Corrector is used in place of the normal protection grid on the microphones and sound level meters, to obtain an omnidirectional characteristic of the 1" microphone.

UA 0051 Nose Cone for mounting on Condenser Microphones Type 4131 instead of the protection grill to reduce wind noise and make the characteristics more omnidirectional.

UA 0122 Adaptor Set contains a flexible adaptor with right angle connector for 1/4" and 1/2" microphones and 2 flush mountings for 1/4" and 1/2" microphones.

UA 0123 Adaptor Set contains a flexible adaptor with straight connector for 1/4" and 1/2" microphones and flush mountings for 1/4" and 1/2" microphones.

UA 0052 Nose Cone similar to UA 0051 but for Type 4133 or 4134.

UA 0053 Nose Cone for 1/4" microphones.

UA 0028 Tripod Adapter for mounting Cathode Follower 2613, 2615 and above cables on a tripod camera stand. Thread 3/8" W.

AR 0001 Tape Microphone Cable is a flat 7-cored cable for use when it is desired to carry microphone cables through closed windows or doors. Thickness 0.2 mm.

Type 2801 Microphone Power Supply to be used in conjunction with B & K Microphones and Cathode Followers in places where B & K Amplifiers or Analyzers are not available. Provides direct cathode follower output, 50 ohms, 200 ohms or 200 ohms symmetrical.

Type 4408 Two-Channel Microphone Selector is a two-channel junction box for automatically or manually switching between two B & K Microphones fed into a single Amplifier.

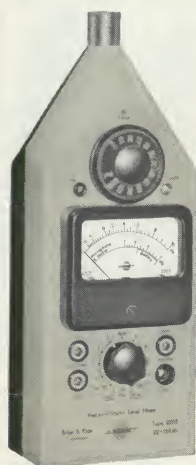
UA 0082 Wind Screen for all types of B & K microphones.

UA 0049 Portable Floor Stand for Sound Level Meter 2203, and for Microphones 4131/36.

UA 0050 Wind Screen reduces wind noise at low wind velocities. Only in conjunction with Type 2613.



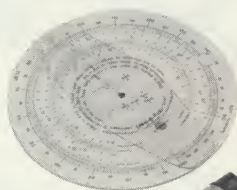
Sound Level Meter Standing Wave Apparatus



2203
1:6



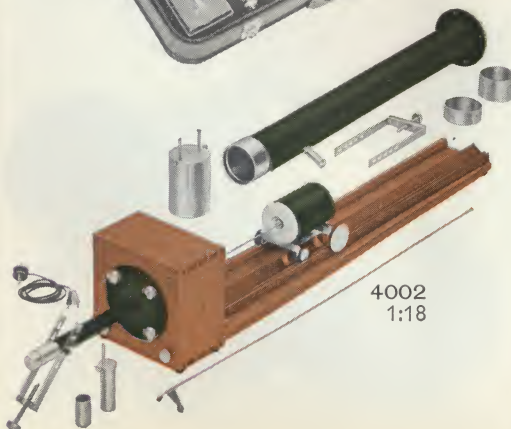
1613
1:6



ZR 0020
1:3



KE 0011
1:15



4002
1:18

Type 2203 Precision Sound Level Meter is a compact battery-operated yet highly accurate instrument for precision sound level measurements. In conjunction with the Band-Pass Filter Set Type 1613 it forms a portable sound analyzer. Precision condenser microphone B & K Type 4131. Other B & K condenser microphones can readily be applied. Amplifier is transistorized for portability and low power consumption. The measuring range for sound level measurements is from 22 dB SL (A) to 134 dB SL. Frequency response of microphone, linear: 20 c/s — 15 kc/s to within ± 1 dB, 20 c/s — 18 kc/s to within ± 2 dB for 0° incidence. The internationally standardized weighting networks are built in. Working temperature -10° to 60°C . Will withstand temperatures from -20° to $+90^\circ\text{C}$ without permanent damage. For convenient measurements the instrument fits to any standard photo tripod.

Type 1613 Octave Filter Set contains 11 octave filters with center frequencies from 31.5 c/s to 31.5 kc/s. The band-pass attenuation is adjustable for each filter from 0 dB to 48 dB. The filter can be screwed onto the Sound Level Meter Type 2203 thus making a compact octave analyzer.

ZR 0020 Integrator. Is designed for use in conjunction with Sound Level Meter Type 2203 for vibration measurements. Velocity range 20 c/s—15 kc/s. Displacement range 30 c/s—4 kc/s. Calculating Disk included.

KE 0011 Carrying Case for Type 2203 with Type 1613 and accessories for field use.

AO 0034 — AO 0035 Connection Cables for Filter Set 1613 when desired to use it with amplifier Type 2603 or 2604. Length 60 cm.

Type 4002 Standing Wave Apparatus for measurements of acoustic absorption coefficients and complex specific impedances of small samples. Frequency range from 100 to 6500 c/s. Supplied with two measuring tubes: Diameters: 10 cm for the frequency range 100—1800 c/s, and 3 cm, frequency range 800—6500 c/s. The probe tube microphone is mounted on a trolley with rubber wheels. The instrument is normally used in conjunction with the BFO 1022, Analyzer 2107 or Spectrometer 2112.

Type 4152 Artificial Ear for measurements on hearing aid receivers. Should be used in conjunction with Cathode Follower 2613 and Microphone Cartridge 4132. The Ear includes a 2-cm³ coupler for insert type telephones, meeting the requirements of both ASA Standard Z. 24.9 — 1949 and the IEC Recommendation Publ. 126 for measurement of hearing aids. The 2 cm³ coupler can be used also on hearing aids with built-in earphones. For measurements on headphones, one 6-cm³ coupler is included, **DB 0160** which fulfils the requirements of the NBS Type 9A Coupler.

DB 0161 which fulfils the requirement of the ASA Z 24.9. — 1949 Type I Coupler is available at extra cost.

Type 4217 Small Hearing Aid Test Box is an anechoic chamber acoustically similar to the 4212 Hearing Aid Test Box, however, with a built-in generator.

It is designed to check the sensitivity and frequency response of hearing aids. The generator provides 15 fixed frequencies adjusted to equal sound pressure level in the range from 200 c/s to 5000 c/s. Type 4217 should be used with a Sound Level Meter Type 2203 as indicator equipped with a 2 cm³ coupler. Power supply to replace batteries of Type 2203 is incorporated in the Test Box.

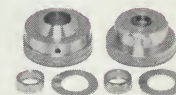
Type 4216 Artificial Mouth is a constant sound pressure source for frequency response measurements on microphones and hearing aids. The Mouth is supplied with a replaceable output coupler and a distance ring on which special fixtures can be mounted. Should be used with BFO Type 1022, Amplifier Type 2603. Regulating microphone Type 4134 and Cathode Follower Type 2615 should be ordered separately.

Type 4212 Hearing Aid Test Box is an anechoic chamber for measurements of the frequency response of all types of hearing aids and small microphones in the frequency range 150 to 5000 c/s. Built-in loudspeaker, regulating precision microphone, and artificial ear with 2-cm³ coupler specially designed for use both on hearing aids with built-in earphones and the conventional types. The Artificial Ear is in accordance with ASA-standard Z. 24.9. and the international IEC Recommendation.

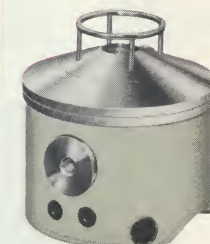
Artificial Ear and Mouth Hearing Aid Test Box,



4152
1:6



DB 0160/0161
1:6



4216
1:4



4217
1:15



4212
1:15

2211 A
1:10

4920 1:10

2212 A
1:10

Type 2211 Noise Limit Indicator is a noise and vibration analyzer designed to keep control on the noise or vibration produced by units leaving a production line i.e. to check that the noise generated by the manufactured units (such as vacuum cleaners, refrigerators, oil-burners, gear boxes etc.) do not exceed the pre-determined limits and to classify the products in noise classes.

It contains two input amplifiers, twelve output amplifiers, relay- and meter circuits, and power-supply. Each output amplifier can be equipped with a band-pass filter so as to measure noise in twelve bands simultaneously. Each band can be set to maintain its own individual noise limit. Available as A- or C-model. **ZS 0250 Filter Set**, to be ordered separately, contains 33 third octave filters with center frequencies of 12.5–16–20 20000 c/s. The filters with center frequencies of 16–31.5–63 16000 c/s can be switched to a width of 1/1 octave, maintaining their center frequencies.

ZS 0251 Filter Set comprises the above mentioned 11 switchable filters.

ZS 0240 Filter Set containing A, B and C weighting networks for Type 2211.

Type 4920 Outdoor Microphone System consists of a 1/2" microphone with cathode follower, raincover, wind screen and cable, and one unit containing power supply, amplifier and calibration generator installed in outdoor housing.

Type 2212 Noise Limit Indicator is based on the same principle as type 2211 above, but contains input channels for 6 microphones to provide noise control at 6 positions. Used with the Outdoor Microphone System Type 4920. Ask for special leaflet. A- or C-model.



The accelerometers shown on this page are transducers giving an electrical signal which is proportional to the acceleration to which they are subjected.

Common data: Max. amb. temperature: 260°C (500°F). Cross-axis-sensitivity: less than 5 % (individually calibrated). Capacity approx. 1000 pF.

Fastening screws: unified NF 10–32 thread.

The accelerometers may be delivered in **sets** containing one accelerometer with 1.2 m cable (with miniature plugs) an insulated perm. magnet clamp, screws and tap for fastening and for ground isolation, probes with pin-point or ball-point nose. Adaptor JP 0028 and calibration chart.

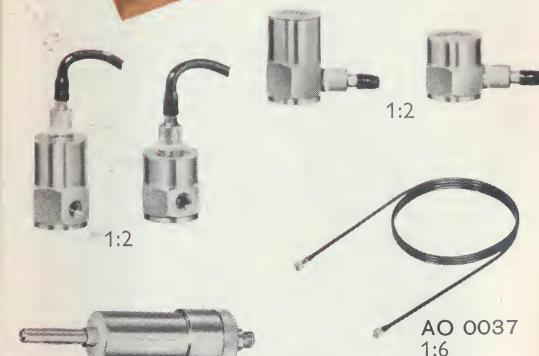
Also the accelerometers may be delivered in **packages** containing 5 accelerometers, 5 cables and 5 calibration charts.

	Accelerometer types			
Sets with Accessories:	4312	4313	4314	4315
Packages of 5:	4352	4353	4354	4355
Sensitivity range mV/g	40–60	12–20	40–60	12–20
Frequency range c/s	2–8000	2–14000	2–8000	2–10000
Natural resonance Frequency	35 kc/s	50 kc/s	35 kc/s	50 kc/s
Weight	30 gr.	13 gr.	30 gr.	13 gr.
Mounting of cable	side	side	top	top
Base Material	st. steel	titanium	st. steel	titanium
Provisions for water cooling	—	—	+	+

AO 0037 Accelerometer cable. 1.2 m with miniature plugs in both ends.

AO 0038 Accelerometer cable similar to AO 0037, but for higher temperatures. Max. amb. temp. 260°C (500°F).

JP 0028 Adaptor converts miniature plug to B & K plug JP 0018.

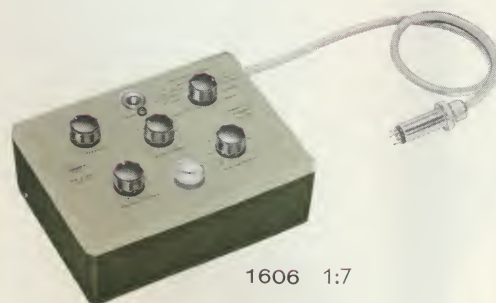
Accelerometer Set
1:3Accelerometer Package
1:3



4290 1:4



1019 B 1:7.5



1606 1:7

Type 4290 Calibration Exciter for the high frequency calibration of accelerometers and other types of vibration pick-ups. Frequency range 50 c/s—30000 c/s. Built-in accelerometer for control of table vibration level. Max. acceleration approx. 1 G. Weight of table 200 grammes.

Type 1019 Automatic Vibration Exciter Control for controlling electrodynamic shaker systems. It consists of an oscillator with logarithmic scale from 5 to 5000 c/s, a frequency sweep unit, a vibration meter, an automatic output control and an automatic displacement-acceleration and velocity-acceleration transfer arrangement. An additional frequency range from 5 to 10 kc/s is provided. The sweep motor permits automatic scanning of any predetermined part of the frequency range with 72 different scanning speeds, 6 of which allow synchronization with B & K Level Recorder Type 2305. The built-in automatic output regulator keeps constant acceleration, velocity or displacement of the vibration level when controlled by means of an accelerometer or velocity pick-up. Regulating speed can be automatically increased with increasing frequency. Automatic transfer from constant displacement or constant velocity to constant acceleration operation is possible at any frequency between 8 c/s and 1000 c/s. Provisions for parallel connection of several units, and a special stand-by position are included.

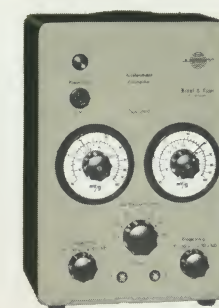
Type 1039 Automatic Vibration Exciter Control is similar to Type 1019 except in a steel cabinet for 19" standard rack mounting.

Type 1606 Vibration Pick-up Preamplifier with high input impedance for use with the Accelerometers 4312—4313—4314 and 4315. Includes an amplifier and integrating networks. Normally used in conjunction with Analyzers 2107, 2112 or Amplifiers 2603, 2604. A small shaker table, operated at mains frequency, is included for the calibration of the Accelerometers and the total measuring arrangement.

Type 2620 Accelerometer Preamplifier is used mainly in conjunction with the Vibration Exciter Control Type 1019 as an impedance transformer for the control signal obtained from an accelerometer. Two separate channels, each with calibrated gain potentiometer. High pass filters with limits of 5, 10 and 50 c/s are provided. High frequency limit 10 kc/s. Output impedances approximately 400 Ω in series with 8 μ F, and 10 k Ω . Input impedance approximately 600 M Ω parallel with 10 pF.

Type 1040 Sine Random Vibration Control Generator. For the control of electro dynamic shaker systems. It contains a sweep generator with built-in motor drive similar to that of Type 1019 and additionally a narrow band random generator providing sweeps of narrow band noise. A wide band random generator is also included. Compressor circuits with automatic increase of regulation speed similar to Type 1019. Frequency range: 5—10000 Hz. Available as B- or C-model.

Type 2501 Vibration Meter is designed for use in conjunction with Random Noise Generator Type 1040. Input facilities for accelerometers and integrating networks for the measurement of velocity, displacement and differentiating network for acceleration gradient. Meter time constants of 0.3—1—3—10—30 and 100 sec. Available as B- or C-model.



2620 1:7



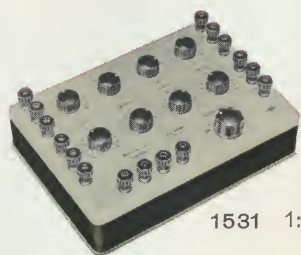
1040 B 1:8



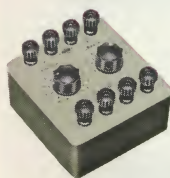
2501 B 1:8



1516 B 1:8



1531 1:6



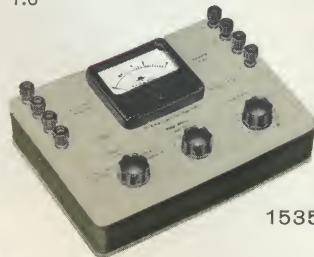
1530 1:6



1538 1:6



1533 1:6



1535 1:6

Type 1516 Strain Gage Apparatus consists of a 3 kc/s oscillator, a bridge circuit, a four-stage amplifier and an illuminated, zero-centered indicating meter calibrated in μ strain. Built-in R and C balancing components. Using the 3 kc/s carrier signal, static and dynamic strain up to 300 c/s can be measured. When utilized with the DC Bridge Supply Unit 1535, measurements of dynamic strains with frequencies up to 100 kc/s can be carried out. Max. sensitivity with four active gages is 25 μ strain (25 μ inches per inch) for full-scale deflection. Least sensitive range 30000 μ strain with one active gage. A wide range of resistance strain gages can be used (10–1000 Ω). Different output facilities for connection to recording instruments such as Level Recorder 2305, or to a Direct Writing Oscillograph in conjunction with a suitable amplifier, or Cathode-Ray Oscilloscope. Accessories included: Type 1530 and 1531, ZR 1540, ZR 1541, two strain gages mounted for testing purposes.

NB: Available only in mahogany cabinet.

Type 1530 Balancing Unit used when the strain gage installation is remote from the 1516.

Type 1531 Balancing Unit is a four-channel bridge switch and balancing unit with separate R and C balancing controls for each channel. Balancing units may be coupled together for manual selection of any desired number of channels.

Type 1533 Variable Balancing Resistor for separating dynamic and static components of complex signals.

Type 1534 Balancing Unit for the separation of bending and elongation of structural members. Measurements may be taken from two points each consisting of two active and two dummy strain gages. R and C balancing components. Any number of units may be employed.

Type 1535 D.C. Bridge Supply Unit provides 0.3, 1, and 3 volt DC bridge voltage for strain measurements in the frequency range from 20 to 100000 c/s. A calibration bridge and meter for gage factor compensation are integral parts of the instrument.



Type 1538 Low-Pass Filter eliminates the 3 kc/s component of the rectified output signal of Type 1516 making possible the direct visual presentation of both static and dynamic strains on an oscilloscope screen. Frequency range 0–100 c/s.

Type 1542 Automatic Selector is a 50-channel selector switch for sequentially connecting a maximum of 50 strain measuring points to the Strain Gage Apparatus Type 1516. Bridge inputs and R and C balancing controls are provided for 10 channels. For the remaining 40 channels two Twenty-Point Panels Type 1543 should be used. The switch may be operated manually or automatically by means of a built-in drive unit. Measuring intervals can be set to 0.5–1–2 or 4 seconds between switching steps. An arbitrary number of positions can be used, and a special "fast return" arrangement can accelerate the switch through the non-measuring portion to the starting point. The switch may also be remotely controlled from the Level Recorder Type 2305. AC operated.

Available only in mahogany cabinet.

ZR 1540 Fixed Balancing Resistor used when the initial unbalance in a strain gage circuit is outside the range of the R-balance component in the 1516.

Available only in mahogany cabinet.

ZR 1541 Fixed Balancing Condenser used when the capacitive unbalance in a strain gage circuit is outside the range of the C balance component in the 1516.

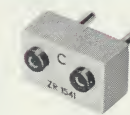
Available only in mahogany cabinet.

Type 1543 Twenty-Point Panel consists of 20 independent R and C balancing units. For use with the automatic Selector Type 1542. Accessories included: 2 \times 30-cored cables with plugs AO 0030.

Available only in mahogany cabinet.



1542 B 1:8

AO 0030
1:8ZR 1541
1:3ZR 1540
1:3

1543 B 1:8



AO 0007 Screened Connection Cable with plug JP 0018 on one end and microplug JP 0006 on the other end. Used to connect Type 2203 or 6102 to other B & K instruments.

AO 0013 Screened Connection Cable with separate screen connector. Length 1.2 m.

AO 0014 Screened Connection Cable similar to AO 0013, but without separate screen connector. Length 1.2 m.

AO 0019 Screened Connection Cable similar to AO 0014. Length 3 m.

AO 0020 Screened Connection Cable similar to AO 0014. Length 10 m.

AO 0027 Extension Cable for the B & K Microphones and Cathode Followers. Length 3 m. 6 mm outside diameter.

AO 0028 Extension Cable. Similar to AO 0027 but double screened, 9 mm outside diameter, low capacity. Length 10 m.

AO 0029 Extension Cable. Similar to AO 0028. Length 30 m.

JJ 0004 Screened Connection Box for parallel-ing four cables AO 0014.

JJ 0005 Extension Connector for connection of cables AO 0014, AO 0019 or AO 0020.

JJ 0014 Screened Socket for panel mounting.

JJ 0018 7-pole Microphone Socket for panel mounting. Standard for B & K instruments.

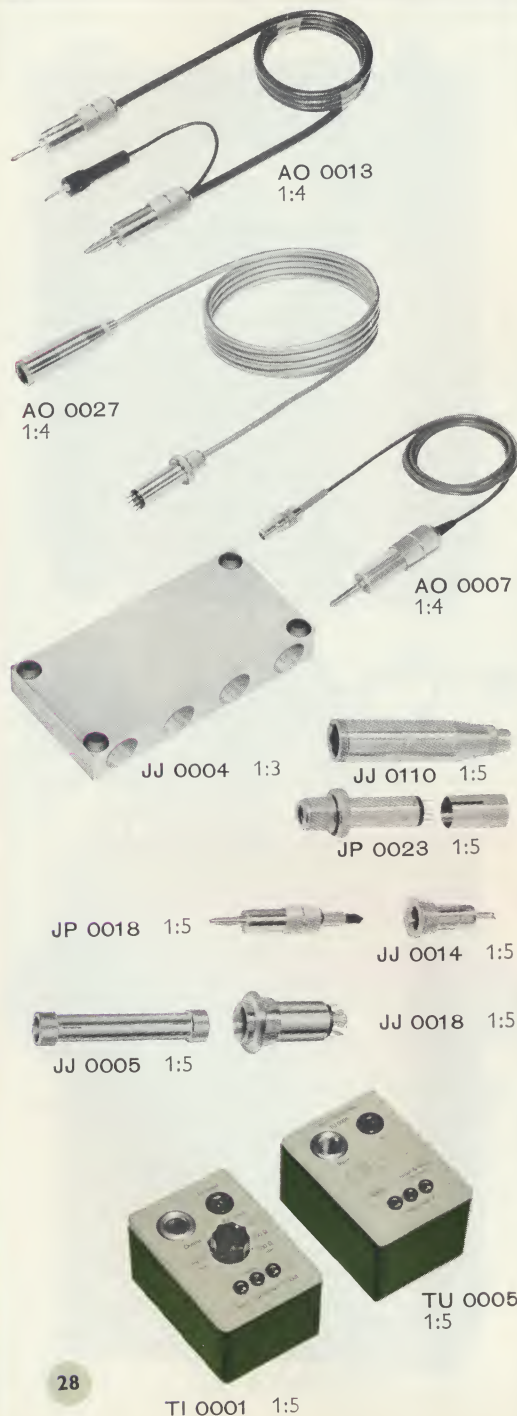
JJ 0110 7-pole Microphone Connector as used in Extension Cables AO 0027, AO 0028, and AO 0029.

JP 0018 Screened Plug. Standard for B & K instruments. Matches JJ 0014.

JP 0023 7-pole Microphone Plug as used on Extension Cables AO 0027, AO 0028, and AO 0029 as well as on Type 2613, 2615 and 1606, 4212 etc. Matches JJ 0018 and JJ 0110.

TI 0001 Input Transformer with symmetrical input for use on Type 2107 — 2112 — 2409 — 2410 — 2603 — 2604 or 2305. Ratio 1 : 1. Accuracy ± 0.2 dB in the frequency range 10 c/s to 20 kc/s. Input impedance 20 kohms or 600 ohms. Low capacity cable AO 0018 included.

TU 0005 Output Transformer with symmetrical output for use with the BFO Type 1022. Output impedance 600 ohms. Transformer ratio $\sqrt{10} : 1$.

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